

REMARKS

Reconsideration of this application is respectfully requested in view of the foregoing amendment and the following remarks.

Claims 35-46 were pending in this application. Claims 35, 37, 39, and 41 have been amended and claims 45 and 46 have been canceled without prejudice. Accordingly, claims 35-44 will be pending herein upon entry of this Amendment. Support for the amendment to each of the claims can be found, for example, in paragraphs [0036]-[0038] and [0048]-[0052] of the present application. The specification of the present application has also been amended to correct several inadvertent errors. For the reasons stated below, Applicants respectfully submit that all claims pending in this application are in condition for allowance.

Claims 35-46 were rejected under 35 U.S.C. §112, first and second paragraphs. Claims 35 and 39 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In addition, claims 35-41 were rejected under 35 U.S.C. 101 because the disclosed invention is inoperative and therefore lacks utility. Claims 35-37, 39-42 and 46 were rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,553,516 B1 to Suda et al. ("Suda") Claims 38, 43 and 44 were rejected under 35 U.S.C. §103(a) as being unpatentable over Suda, in view of U.S. Patent No. 6,598,202 B1 to Kim et al. ("Kim").

To the extent these rejection might still be applied to claims presently pending in this application, they are respectfully traversed.

Rejections under 35 U.S.C. §112, first and second paragraphs and 35 U.S.C. 101

Amended claim 35 now recites:

a device used for interleaving in turbo codes, comprising:

means for grouping a source sequence of symbols into a sequence of M blocks, wherein M is the number of the blocks and M is determined by the number of symbols of a source sequence, and wherein each block includes L number of symbols;

means for performing intra-block permutations on the sequence of M blocks to produce an intra-block permuted sequence by re-ordering the symbols within each block of the sequence of M blocks;

means for grouping the intra-block permuted sequence into an intra-permuted sequence of blocks; and

means for performing inter-block permutations on the intra-block permuted sequence of blocks by re-ordering the symbols in each block of the intra-permuted sequence of blocks across a number of blocks to form an interleaved output sequence of symbols, wherein the symbols of a given block K in the intra-permuted sequence of blocks are re-ordered across E_K blocks prior to the given block K and L_K blocks after the given block K, wherein E_K is an integer of $\min(D, K-1)$ and L_K is an integer of $\min(D, M-K)$, and D is a parameter associated with the inter-block permutation.

Similar amendments have also been made to claim 39.

As amended, independent claims 35 and 39 no longer recite “in a block-by-block manner” and “once the intra-block permutations has initiated.” These claims now define that “D is a defined positive integer associated with the inter-block permutation.” The term “sub-blocks” appearing in these claims has been amended to “blocks” for consistency. Furthermore, the K^{th} block is now defined as “a given block K of the intra-permuted sequence of blocks” and the number of blocks to be re-ordered across by the symbols of the given K^{th} block of the intra-permuted sequence of blocks are defined more clearly in the amended claims.

The amendments have support in the specification. For example, paragraph [0036] describes the feature of grouping a source sequence of symbols into a sequence of blocks 205

(i.e., M blocks), paragraph [0036] describes the intra-permutation, and paragraph [0037] describes the intra-block permuted sequence and grouping the intra-block permuted sequence into an intra-permuted sequence of blocks. Further, paragraphs [0038] and paragraphs [0048]-[0052] describe how to perform inter-block permutations on the intra-block permuted sequence of blocks by re-ordering the symbols in each block of the intra-permuted sequence of blocks across a number of blocks to form an interleaved output sequence of symbols,

In view of these amendments and foregoing explanation, it is believed that amended claims 35 and 39 and their dependent claims meet all requirements of 35 U.S.C. §112, first and second paragraphs and their rejections under 35 U.S.C. §112, first and second paragraphs should be withdrawn.

As claims 45 and 46 have been canceled, the rejection of these claims is now moot.

In addition, Applicants submits that amended claims 35 and 39 and their dependent claims 36-37 and 40-41 are fully operative and thus meet the requirements of 35 U.S.C. 101. Therefore, it is respectfully requested that the rejection under 35 U.S.C. 101 be withdrawn.

Rejections under 35 U.S.C. §102 (e) and §103(a)

As described in paragraph [0032] of the specification, “conventional interleavers used in turbo codes do not render themselves suitable for parallel decoding” and the “features and principles consistent with the present invention illustrate, along other things, an interleaver design that allows parallel decoding.” To do so, as recited in claims 35 and 39, the device and the method include “performing inter-block permutations on the intra-block permuted sequence of blocks by re-ordering the symbols in each block of the intra-permuted sequence of blocks

across a number of blocks to form an interleaved output sequence of symbols, wherein the symbols of a given block K in the intra-permuted sequence of blocks are re-ordered across E_K blocks prior to the given block K and L_K blocks after the given block K, wherein E_K is an integer of $\min(D, K-1)$ and L_K is an integer of $\min(D, M-K)$, and D is a parameter associated with the inter-block permutation."

Suda fails to teach the above feature as recited in amended claims 35 and 39. At least from the description of col. 5, lines 53 to col. 6, lines 25 and col. 7, lines 50-67, the intra-permutation uses tables t0-t7 created in steps S1-S7 as an address table, and processes input data written into the two-dimensional buffer by referring to the address link. For example, in step S1, a primitive root g_0 of the Galois field of the characteristic P is obtained and a table t0 described in the order of exponential (power) notation of the primitive root is created. In step S7, the data arranged in the first through eighth rows of a two-dimensional buffer in which blocks B_1 - B_8 are written are permuted in accordance with the sequence permutation table t0-t7. According to Suda, each of the blocks B_1 - B_8 is permuted in accordance with a specific table sequentially. That is, a decoding module must wait until at least almost all symbols are interleaved, i.e., the delay per decoding run is about the entire length of a 2-dimensional array of Suda. Therefore, like conventional interleavers, Suda is not suitable for parallel-decoding.

In addition, Suda describes an array-by-array permutation, in which both intra- and inter-permutations are performed within an array, unlike the feature of performing inter-block permutations on the intra-block permuted sequence of blocks by re-ordering the symbols in each block of the intra-permuted sequence of blocks across a number of blocks to form an interleaved

output sequence of symbols, as recited in amended claims 35 and 39. Accordingly, it is respectfully submitted that the rejections of claims 35-37 and 39-42 under 35 U.S.C. 102(e) should be withdrawn and that amended claims 35 and 39 are patentable over Suda.

Similarly, Kim describes frame-to-frame permutations, in which both intra- and inter-permutations are also performed within a frame. Kim also fails to teach or suggest the features of performing inter-block permutations on the intra-block permuted sequence of blocks by re-ordering the symbols in each block of the intra-permuted sequence of blocks across a number of blocks to form an interleaved output sequence of symbols, as recited in amended claims 35 and 39.

Regarding to the rejection of claims 38, 43, and 44 under 35 U.S.C. 103(a) as being unpatentable over Suda in view of Kim, Applicants respectfully submit that the rejection should be withdrawn at least due to their dependencies from patentable independent claims 35 and 39.

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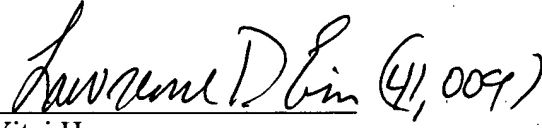
In view of the foregoing all of the claims in this case are believed to be in condition for allowance. Should the Examiner have any questions or determine that any further action is desirable to place this application in even better condition for issue, the Examiner is encouraged to telephone applicants' undersigned representative at the number listed below.

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